

drawn into the measuring apparatus and made to occupy a volume which is equal to 79 per cent of that previously occupied by it. The difference of pressure from the former value is noted. As normal air contains 21 per cent oxygen the second pressure will be approximately equal to the first, and it is the difference between the two which indicates the departure of the oxygen content of the sample from that of normal air. 3 mm. pressure-difference on the mercury column corresponds with 1 per cent difference in oxygen content and readings can be obtained to 1/20th of a mm., or 1/60th of 1 per cent. The results of a test on a known sample of air (20.42 per cent of oxygen) are given. The value obtained by the use of the apparatus was 20.39 per cent.—*J. S. Dines*.

A METHOD OF MEASURING VISIBILITY.

By A. WIGAND.

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An instrument is described consisting of seven circular transparent glasses, mounted around a rotating disc attached to a frame, which can be fitted over the observer's eye in such a way that the glasses can be brought successively across the field of view while the eye is sheltered from stray side-light. The glasses vary regularly in opacity and are numbered 2, 4, 6, 8, 10, 12, and 14 respectively corresponding to the degree of opacity on an arbitrary but fixed scale. A rotating arm mounted on the axis of the disk carries another transparent glass of which the opacity is 1 on the same scale, so that an observer can interpose an opacity corresponding with any whole number from 1 to 15 between his eye and an object. Definite objects having been selected at various known distances from the observer, the method of observation is to select that transparent glass through which an object can just be seen, and to name as corresponding opacity given by the instrument the number of the glass next higher on the scale, through which the object is invisible. Experiment has shown that on a day of max. visibility the mean opacity number of the instrument is 14.3. If a is the opacity number on any occasion, $14.3-a$ is a measure of the lack of transparency of the atmosphere for the particular object seen, and $(14.3-a)/l$, where l is the distance of the object, is a measure of the lack of transparency of the air for unit distance of the object. The reciprocal of this, namely, $l/(14.3-a)$ is defined as the visibility (*Sicht*) of the air. Certain precautions required for making an observation, a list of causes of deterioration of visibility, and a number of actual observations are also given, together with a diagram which serves for the rapid evaluation of the above quantity for different values of a and l .—*R. C.*

LIGHTNING FIGURES.

In Symons's Meteorological Magazine for December, 1919, is a note by James G. Wood correcting the statement made by Dr. Newell in a note in the October number of the same magazine (abstracted in Monthly Weather Review, October, 1919, p. 729) relative to "impressions of branches and leaves" on the human body due to lightning strokes. Such markings are not uncommon and are due to the "ramification of an electric discharge."—*C. L. M.*

THE TOTAL SOLAR ECLIPSE OF MAY 29, 1919, AT CAPE PALMAS, LIBERIA.¹

By Dr. LOUIS A. BAUER.

(Author's abstract.)

[Dated: Washington, D. C., Dec. 6, 1919.]

The station at Cape Palmas, Liberia, (lat. $4^{\circ} 22' N.$, long. $7^{\circ} 43.7' W.$) was one of five principal stations at which magnetic and allied observations were carried out by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington in connection with the solar eclipse of May 29, 1919. Two of these stations, Sobral, Brazil, in charge of Mr. D. M. Wise, assisted by Mr. A. Thomson, and Cape Palmas, Liberia, in the author's charge, who was assisted by Mr. H. F. Johnston, were inside the belt of totality. A third station, at Huayao, Peru, north of the totality belt, was in charge of Dr. H. M. W. Edmonds; the fourth station south of the belt of totality, at Puerto Deseado, Argentina, was in charge of Mr. A. Sterling; and the fifth, about 100 miles north of the belt of totality, at Campo, Cameroun, was in charge of Mr. Frederick Brown. Observations were also made at a secondary station, Washington, by Mr. C. R. Duvall.

In addition to these stations, special magnetic observations were made at the Department's magnetic observatory at Watheroo, Western Australia, and at observatories all over the globe, both inside and outside of the region of visibility of the eclipse. Reports have already been received from many of these foreign observatories. The reports indicate that the magnetic conditions were ideal for the detection of a possible magnetic effect of the order to be expected from our previous eclipse magnetic observations. As soon as the various observations have been examined and discussed, a paper will be presented before the Society upon the results obtained.

The prime object of the present paper is to give a general account of our expedition to Cape Palmas, Liberia, also to relate the phenomena observed during the total eclipse, and the experiences encountered en route to Liberia and in Liberia itself.

Totality lasted at Cape Palmas about 6 minutes and 33 seconds, longer than at any other accessible station in the belt of totality. The general indications, as the eclipse occurred during the rainy season, were that Cape Palmas would not be a suitable station for the astronomer. However, for the purpose of our investigations, it did not matter whether we had a clear sky or not, for a magnetic effect will pass through any layer of clouds. It happened, however, that in spite of general expectation, we had clear weather, and this now for the third time, whereas parties at other stations which appeared more favorable according to past meteorological records, were unfortunate. Our observation program included magnetic and electric observations, meteorological observations, shadow band observations, times of contacts and photographs such as could be obtained with our small Kodak cameras. This comprehensive program was carried out successfully, excepting the atmospheric-electric work which, owing to the deterioration of the dry-cell batteries purchased in England, had to be abandoned. Although I had stationed three observers, no shadow bands were observed this time, even greater

¹ Presented before the Philosophical Society of Washington, Oct. 11, 1919.